

PSYCHE.

BIOLOGICAL NOTES ON AMERICAN GRYLLIDÆ.

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GRYLLOTALPA BOREALIS.

The burrows of this mole cricket are in the main very superficial, lying just beneath the surface of the soil and running in entirely irregular directions. The insects seem to push their way where the soil yields most readily and take advantage of natural furrows and crevices. The burrows are generally so near the surface that the earth is pushed up above them into ridges which can be easily traced, and when the soil dries after a rain portions of the ridges fall in and expose the burrows. They frequently fork and occasionally turn abruptly downward into blind passages, in which I have failed to find anything. Apparently one insect, or at most a pair, ♂ and ♀, occupy a single burrow, and males are rarely found nearer together than thirty feet, never apparently nearer than ten or fifteen feet. Rathvon, however, says (Rep. dep. agric., 1862, 378) that in a meadow near Lancaster, Penn., over a hundred specimens were once taken in a piece of ground about six feet square. Usually the burrows are just large enough for the crickets to move in (and these insects move backward as readily

as forward); but they occasionally enlarge into lateral chambers seldom larger than a pigeon's egg, which enables them to turn around; and in such chambers the eggs are laid in masses of a hundred or thereabouts adhering to the rootlets of *Potentilla* and other plants. The eggs are spherical, white or almost colorless, and have a diameter of 0.7 mm. The newly hatched larva can leap like a *Tridactylus*.

TRIDACTYLUS TERMINALIS.

Messrs. Sanborn and Thaxter once found mature specimens in burrows of *Gryllotalpa borealis* on the shores of Winter Pond, in Winchester, Mass. I found on visiting the spot that their own burrows were made in gravelly, sandy soil and were very superficial, not more than an inch below the surface. I saw one come out of its burrow, which it did rather slowly, but as soon as its body was three-fourths in sight, it leaped away. They leap in a lively manner to the distance of one or two yards; and when disturbed move either backward or forward with sudden starts after the manner of *Gryllotalpa*. The

burrow from which the specimen was seen to emerge was 1.5 mm. in diameter and at first vertical. Early in October more young than mature were found, but the young were mostly pupae though scarcely half the size of the adult; the two sexes seemed to be equally common.

The testes of the male are so situated that the upper rounded tips lie at the base of the fore-legs, *i. e.*, they just extend into the prothorax; they are approximated, the smaller front lobe whitish, the posterior brownish and those of opposite sides are separated by about half their transverse diameter.

GRYLLODES SP.

What appears to be an undescribed species of *Grylloides*, allied to *G. abortivus*, was found by Mr. C. J. Maynard in Florida in an interesting position. As I have only a single specimen, a female pupa, it is not possible to determine the species more definitely. Mr. Maynard writes me that when at Jacksonville in January, 1869, he observed small heaps of freshly moved sand about an inch and a half high, removing which with care he came to a small hole; this he followed to an oblong chamber near by, near the surface of the ground, about two inches long, one wide and three-quarters of an inch deep, on the floor of which were scattered bits of leaves and grass. At each extremity of this chamber (the first discovered) was found a vertical burrow about three inches in depth, one of them empty and at the bottom of the other

“a large blue black beetle with immense jaws.” In other similar chambers only one vertical burrow was found, from three to six inches in depth, and this inhabited at the very bottom by this cricket. The chamber was made in the close vicinity of a plant closely resembling our common dandelion and the burrows penetrated between the roots of the same; the bits of leaf found in the chambers were also of the same plant.

It is to be hoped that future observers in the south will follow out this clew and obtain the perfect insect for closer determination. At some future time I hope to publish a sketch of the burrow and surroundings made by Mr. Maynard.

OECANTHUS NIVEUS.

In preparing for oviposition, the female, standing head upward, first removes or scrapes the bark of a raspberry or other shoot with its jaws at the point where she wishes to insert an egg. Then, bringing both hind tarsi forward to their utmost so as to approach the head, the body, without moving the hind tarsi, is extended forward until hind femora and tibiae are at right angles, the ovipositor is placed at the angle the eggs will subsequently have in the stem and its point is then exactly at the centre of the bitten portion. While the legs now clasp the stem tightly, the ovipositor is worked with a slight upward and downward movement and the body at the same time swayed gently from side to side. The hole drilled, the egg is laid without previously withdrawing the

ovipositor, and during this latter movement the anal cerci tremble slightly. Two operations, including both drilling and oviposition, which were timed, took six and a half and five and a half minutes respectively. As soon as one egg is laid, the female proceeds to attack the bark again in a new place at a very short remove from and above the other, and uses the bits of bark torn off to conceal the opening of the hole below, fastening them in place by the aid of its "molasses," so that when it hardens it presents the rough appearance one always sees at the entrance; but if these are removed the opening of the hole will be found clean and splinterless. The insect bores but two or three holes at a time and after a delay returns to the same spot to renew operations, meanwhile leaving the uppermost hole unplugged, although those below are often revisited in the pauses of oviposition to spread more fluid on the other completed drills. This explains why the uppermost drill of a series is often found unclosed at the opening, the insect having perhaps been frightened away altogether before the entire completion of her task.

The egg-holes are drilled at an average

of 1.1 mm. apart and are 0.4 mm. in diameter at the entrance. The harder outer portion of the stem of the raspberry is first bored through almost vertically but a little downward, while in the pith the drills incline downward in a slight curve (just that of the egg), the general trend of the deeper portion being at angles varying from 135° to 170° but averaging about 145° to the trend of the initial portion.

The eggs are nearly cylindrical, tapering slightly and well rounded at the ends, both ends alike in this respect, 2.65 mm. long and 0.55 mm. broad, the top end, occupying a length of two-fifteenths of the whole, covered with little crowded papillae which diminish in size away from the tip, and where they fade the surface becomes studded with lozenge shaped depressions 0.017 mm. long and half as wide. When first laid the eggs are of a uniform very pale green, but later become brownish amber or pale brassy, but with a pale brownish yellow layer at the lower end. The eggs are extruded cap-end hindmost.

This insect seems to prefer to eat the harder parts, the ribs and veins, of leaves.

BIBLIOGRAPHICAL NOTES.—V.*

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* For Nos. I-IV, see Vol. 6.